Dr. INVIVO Niche Regen

All-in-One for Organ/Tissue Decellularization & Recellularization

ROKIT HEALTHCARE

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Organ Regeneration is Our New Reality

ROKIT HEALTHCARE is a global healthcare company committed to providing an anti-aging and organ regeneration platforms using hyper personalized precision medicine and digital healthcare.

Dr. INVIVO (4D Bio-printer)

World's first medically adopted 4D bio-printer for regenerative medical treatment

Dr. INVIVO Niche Regen

All-in-one automatic device for organ and tissue decellularization & recellularization

Dr. INVIVO EDU

Bioprinting educational program for bio-medical pioneers

Bio Ink

Customized bio-ink for stem cell culture (INVIVO-GEL)
Primary human cell derived organ specific ECM for organoid culture (HumaTein)

NMN

One of the most well-known anti-aging supplement for boosting cell metabolism and genetic expression for expanding the lifespan

React Neuro VR

Neurological evaluation VR device co-developed by Harvard and ROKIT

Single Cell Analysis

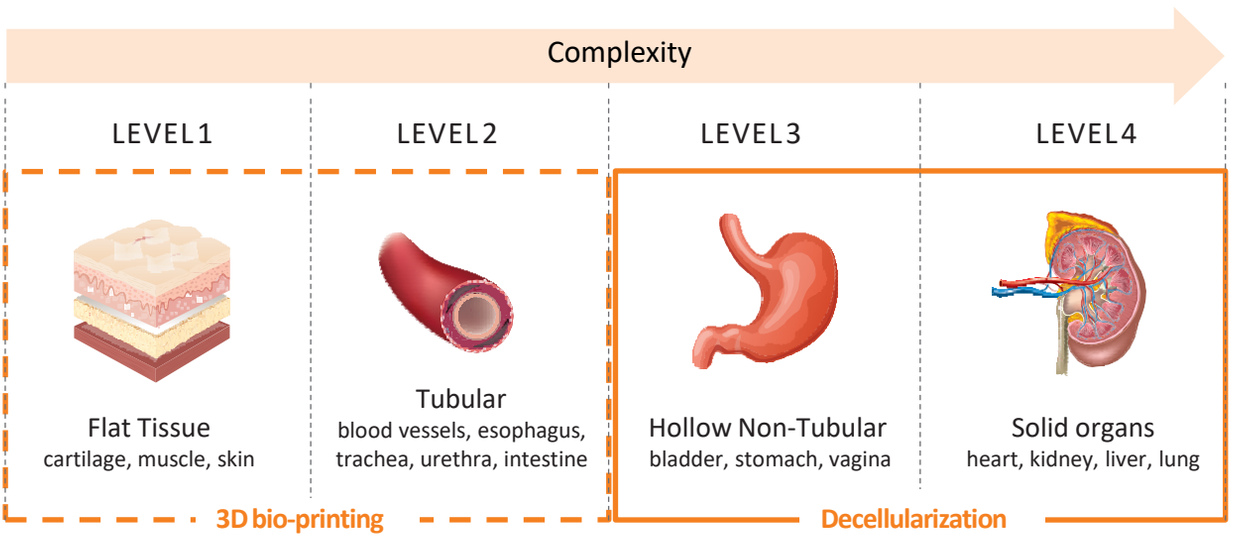
Next generation technology to be utilized for personalized medicine and precision diagnosis by dissecting cellular heterogeneity in multiple tissue types

KOSZEG Wellness Anti-aging Center

Multi healthcare platform center nearby Alphs region, equipped with ROKIT's latest medical technology and premium healthcare service

Tissue Engineering

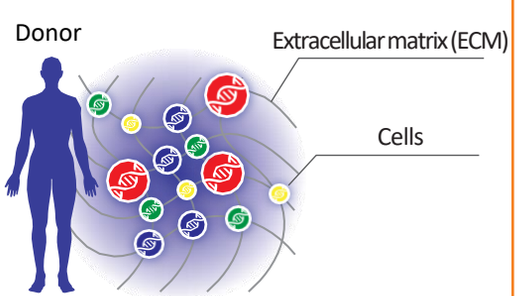
Organ regeneration can be divided into stages from flat tissue to functional solid organ according to its complexity. Although 3D bio-printing technology can simulate simple one- and two-dimensional structures, there is a limit to simulating organs with complex structures beyond three dimensions. Regeneration of these complex organs can be achieved through decellularization technology. .

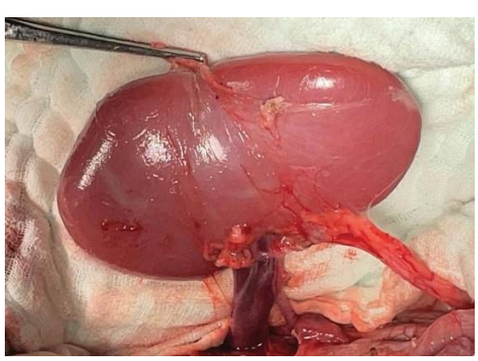


Technology of Decellularization & Recellularization

During organ transplantation, the cells of the donor and the extracellular matrix (ECM) are all transplanted to the recipient, and immune rejection may occur as a side effect. Organs that have removed all the donor's cells using decellularization technology, leaving only the structure, are recellularized with recipient's cells. This new technology can reduce the immune rejection after organ transplantation.

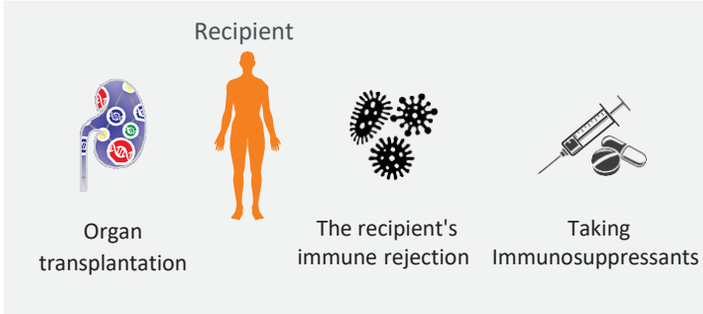
Organ Donation





Organ from donor

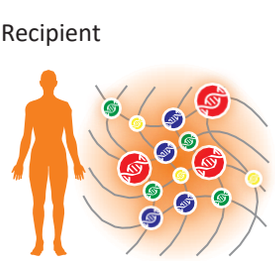
Organ Transplantation



Decellularization

Removal of donor cells to eliminate immune rejection

Recellularization



Recellularization of organs with recipient cells

Dr. INVIVO Niche Regen

Developed with a focus on the convenience of researchers, **Dr.INVIVO Niche Regen** has an automatic system of the entire process using sensors and is optimized for decellularization and recellularization.

Clean system

Internal clean system through UV and HEPA filters

Negative pressure

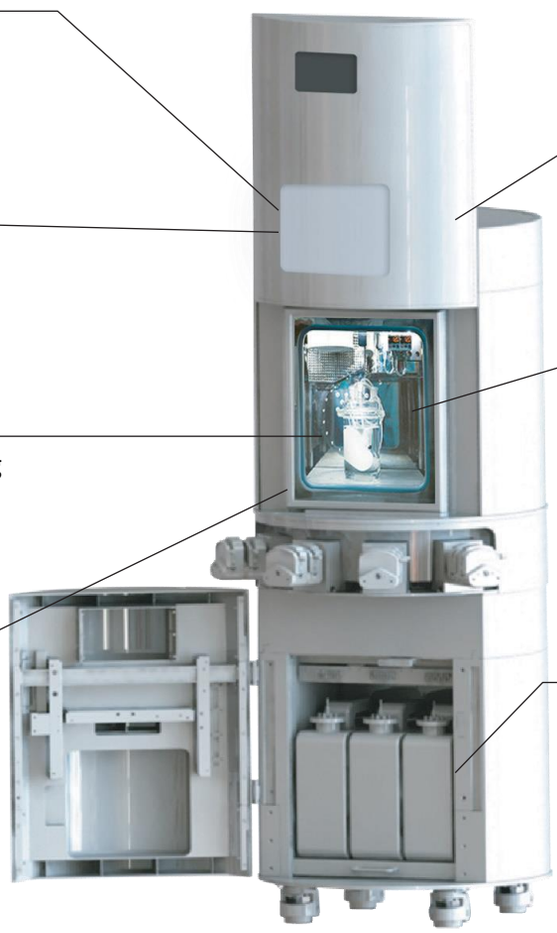
Increased perfusion efficiency using negative pressure of vessels

De-bubbles system

Prevents bubbles from entering the organ during perfusion

Sensor of perfusion (pressure)

Flow rate control (0 ~ 100 ml/min) by measuring liquid pressure



Temperature control (8 ~ 37 ℃)

Cold chamber for decellularization
Heating system for recellularization

Stirring system

Built-in stirrer enables suspension culture for tissue slices or cells

Solution storage
Water level sensor

Large solution reservoir (10 L x 3) & waste tank (20 L x 1) for extend the solution replacement cycle
*Real-time monitoring for solution level

Products	Usage
Niche Regen Detergent	Sterile solution for decellularization
Niche Regen Wash	Sterile solution for wash
Niche Regen Sterile	Solution for sterilization
Decellularized tissue powder	Tissue/organ powder after decellurization and lyophilization

- **Patent application**
- **FDA medical device Class I.**

Dr. INVIVO Niche Regen at a Glance

Dr.INVIVO Niche Regen STANDARD includes Organ Vessel (9L) and Cell Vessel (1L) that enable decellularization and recellularization of organs. **Dr.INVIVO Niche Regen PREMIUM**, which has additional Reactor Vessel (9L), DO sensor, and pH sensor, can be used as a bio-reactor in addition to decellularization and recellularization processes. If decellularization of multiple organs is required, the extended **PLUS version** with additional Organ vessel (8L) can be selected.

Senser Type

Temeprature | Pressure | Water level | Dissolved oxygen | pH

STANDARD

Dr.INVIVO Niche Regen
+ Organ vessel (9L)
+ Cell vessel (1L)

PREMIUM

Dr.INVIVO Niche Regen
+ Organ vessel (9L)
+ Cell vessel (1L)
+ Reactor vessel (9L)

DECELLULARIZATION

Organvessel (9L)

* Peristaltic pump
* Temperature sensor
* Negative pressure
* Water level meter

RECELLULARIZATION

Cell vessel(1L)

* Peristaltic pump
* Temperature sensor
* CO_2 supply

BIOREACTOR

Reactorvessel (9L)

* Temperature sensor
* DO sensor
* pH sensor

STANDARD PLUS / PREMIUM PLUS

The **PLUS** option includes an additional organ vessel (8L) which enables simultaneous decellularization of multiple organs.

Applications

Kidney | Liver | Heart | Brain | Stomach | Uterus | Lung

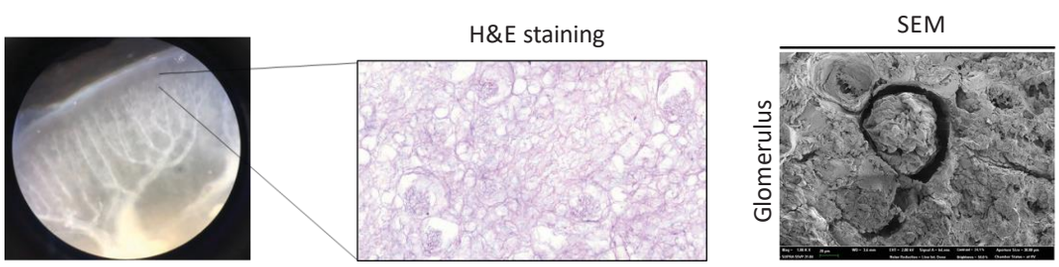
Automatic system

A fully automated program system allows the device to supply and discharge solutions based on preset protocols at each stage. In addition, these processes can be monitored in real time through the built-in camera.

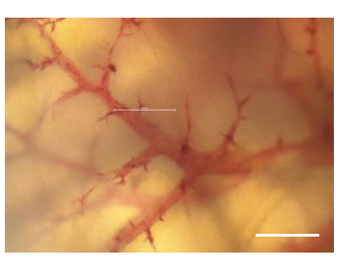
Protocol

Decellularization

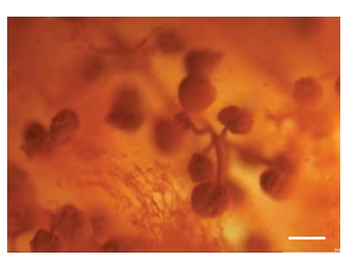
The perfusion system of **Dr.INVIVO Niche Regen** allows preservation of microvascular structures.



The structure of glomeruli was preserved after Kidney decellularization (H&E staining, SEM image).



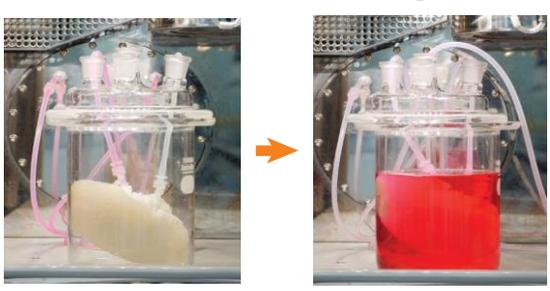
The preserved vascular microstructure (angiography)
Scale bar = 500 µm



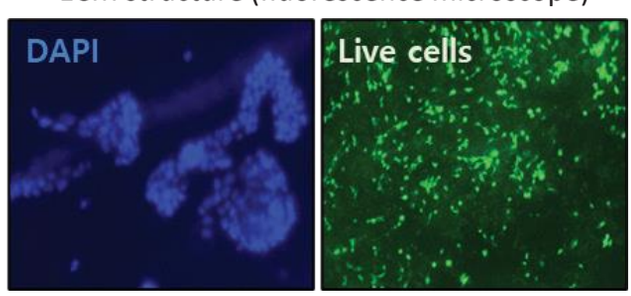
The preserved glomerulus (microscopy)
Scale bar = 200 µm

Recellularization

Recellularization of organ
with **Dr.INVIVO Niche Regen**



Cells that are cultured along the
ECM structure (fluorescence microscope)

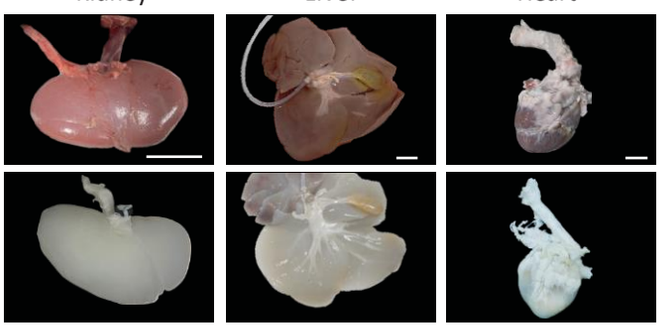


Cells are delivered into the decellularized organ through vascular perfusion system and attached along the structure of the organ's preserved ECMs.

01. Organ Transplantation

Capacity of large vessels (pig)

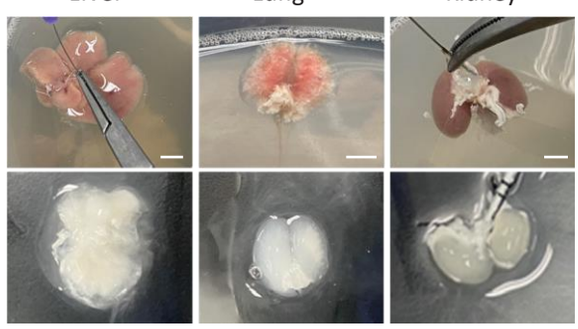
Kidney | Liver | Heart



Scale bar =5 cm

Capacity of small vessels (rat)

Liver | Lung | Kidney



Scale bar =1 cm

02. Scaffold Use

Applicable for replacing or regenerating the damaged organs and tissues with the scaffolds

- **Drug delivery**: Drug can be delivered using the scaffold
- **Therapeutic tissue transplantation**: The scaffold containing cells can be transplanted into dama ged organs or tissues
- **Disease modeling & drug screening platform**: The scaffold can be used for the efficacy and toxicity testing of disease modeling and drug screening platforms

Decellularized organ slices

Cell toxicity & viability analysis of decellularized slices

03. Biomaterial

The preserved extracellular matrix (ECM) from decellularized organs or tissues can be used as biomaterials such as bio-ink

Decellularization → Lyophilization → Powderization

Publisher
ROKIT Healthcare, Inc.
12F, Gasan High-heal bldg., 9, Digital-ro, 10-gil,
Geumcheon-gu, Seoul, Republic of Korea

Web | rokithealthcare.com
Tel | +82 1899 7296
Email | Organregen@rokit.co.kr